CLEAN DEVELOPMENT MECHANISM

CDM-MP83-EC02-A02

Draft Small-scale Methodology

AMS-II.G.: Energy efficiency measures in thermal applications of non-renewable biomass

Version 12.0

Sectoral scope(s): 03

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Executive Board of the clean development mechanism (CDM) (hereinafter referred to as the Board), at its 105th meeting, requested the Methodologies Panel (MP) to continue working on the issue of stove stacking to develop best practice examples for inclusion in the methodologies “AMS-I.E: Switch from non-renewable biomass for thermal applications by the user” and “AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass”, and recommend revision to these methodologies at a future meeting, after taking into account input from experts and stakeholders.

2. Purpose

2. The purpose of this revision is to respond to the mandate from the Board in paragraph 1 above and to incorporate the previous clarifications approved by the Board in relation to this methodology.

3. Key issues and proposed solutions

3. The proposed revision:

   (a) Provides guidance to address the issue of stove stacking (i.e. use of multiple stoves and fuels in the project households);

   (b) Clarifies the procedures to determine the parameter for efficiency of pre-project device;

   (c) Sets a cap for wood-to-charcoal conversion factor; and

   (d) Provides examples for a default schedule of linear decrease in efficiency.

4. Impacts

4. Improvements in methodological requirements will facilitate the implementation of CDM project activities and PoAs in the household cookstove sector, which have strong relevance for least developed countries and other regions that are underrepresented in the CDM.

5. Subsequent work and timelines

5. The MP agreed on the draft elements of the revision as contained in this draft revised methodology. After receiving public inputs on the document, the MP will continue working on the revision of the approved methodology at its next meeting, for recommendation to the Board at a future meeting of the Board.

6. Recommendations to the Board

6. Not applicable (call for public inputs).

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical project(s)	Introduction of efficient thermal energy generation units utilizing non-renewable biomass (e.g. complete replacement of existing biomass-fired cookstoves or ovens or dryers with more efficient appliances), or retrofitting of existing units reducing the use of non-renewable biomass for combustion
Type of GHG emissions mitigation action	Energy efficiency: Displacement or energy efficiency enhancement of existing heat generation units results in saving of non-renewable biomass and reduction of GHG emissions

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology comprises efficiency improvements in thermal applications of non-renewable biomass. Examples of applicable technologies and measures include the introduction of high efficiency biomass fired project devices (cookstoves or ovens or dryers) to replace the existing devices and/or energy efficiency improvements in existing biomass fired cookstoves or ovens or dryers.[1]

3. In the case of cookstoves, the methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 per cent. Refer to the requirements indicated in “Data / Parameter table 14” which details the options for testing and certification as well as supporting documentation (e.g. certificate issued by third party or test results) that needs to be presented to the validating DOE.

2.2. Applicability

4. The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.

5. Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.

6. For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology.

7. If the project device requires a specific fuel for this device (e.g. briquettes, pellets, woodchips), the consumption of the fuel should be monitored during the crediting period.

8. The CDM-PDD or CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission

[1] Implementation of Greenfield applications is not covered in this methodology.

reductions such as unique identifications of product and end-user locations (e.g. programme logo).

Box 1. Non-binding best practice example 1

As per the standard for sampling and surveys for CDM project activities and programme of activities (sampling standard), PPs/CMEs/DOEs shall ensure that samples are randomly selected and are representative of the population.

The listing/recording of information of all end-users is important to meet the requirement above. That is, if ex post monitoring survey conducted to confirm that the devices are still operating is based on sample survey, the sample selection should be on a random basis to ensure results are unbiased estimates of the parameters and each device would have an equal chance to qualify in a sample.

The above approach enables identification of the devices that are distributed only through the specific CDM project activity under consideration, particularly if multiple projects are underway. Furthermore, in the case of programme of activities (PoAs), above steps ensure avoidance of double counting within the PoA (the same device belonging to two different CPAs of the same PoA) and double counting in situations external to the PoA (the same household belonging to two different PoAs for the same techonology).

Thus, unique identification of product (e.g. programme logo, serial number) and end-user locations (e.g. database of all end-users including their names, addresses, telephone numbers) avoids double counting as well as allows implementation of unbiased and reliable sample schemes.

9. The CDM-PDD or CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.

2.3. Entry into force

10. The date of entry into force is the date of the publication of the EB ~~105~~ # meeting report on ~~28 November 2019~~ DD Month YYYY.

2.4. Applicability of sectoral scopes

11. For validation and verification of CDM projects and programme of activities by a designated operational entity (DOE) using this methodology, application of sectoral scope 03 is mandatory.

3. Normative references

12. Project participants shall apply the “Guideline: General guidelines for SSC CDM methodologies”, “TOOL21: Demonstration of additionality of small-scale project activities” and “TOOL19: Demonstration of additionality of microscale project activities” available at: <http://cdm.unfccc.int/Reference/Guidclarif/index.html#meth> and <https://cdm.unfccc.int/Reference/tools/index.html> mutatis mutandis.

13. This methodology also refers to the latest approved versions of the following approved standards, methodology(ies) and tool(s):

    (a) "AMS-III.BG.: Emission reduction through sustainable charcoal production and consumption";

    (b) "TOOL30: Calculation of the fraction of non-renewable biomass";

    (c) "Standard: Sampling and surveys for CDM project activities and programme of activities".

4. Definitions

14. The definitions contained in the Glossary of CDM terms shall apply.

15. The following definition shall also apply:

    (a) **Batch** - is defined as the population of the device of the same type commissioned during a certain period of time (e.g. week or month) in a certain calendar year. To establish the date of commissioning, the Project Participant may opt to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.[2]

Box 2. Non-binding best practice example 2

Project proponents may define the batch for a period that is shorter than a full year.

The concept of batch was originally introduced as an option to simplify the monitoring of the loss of efficiency for year "y" as required in paragraph 37. When using the batch approach, PP/CME is required to annually monitor the efficiency of the devices of the first batch only, and the result is taken as a proxy for the subsequent batches.

However, it should be noted that once batches are defined it would be necessary to calculate the emission reductions separately for each batch of project devices, as denoted by index j in equations of the methodology (e.g. equation 1).

For sample-based surveys, as long as the requirements in the methodology and sampling standard are met, whether or in what way the batches are considered is subject to the discretion of the project participant and survey design (e.g. it depends on the parameter, type of survey method chosen, frequency of survey, data collection method).

[2] If the efficiency drop of project devices is monitored through the first batch approach (see paragraph 37 below), project participants shall describe in the PDD the measures taken to ensure that all batches receive the same level of quality control in the production, and maintenance/replacements during the crediting period, as the first batch. Monitoring reports shall describe the number of actions taken for maintenance and replacements to all batches separately.

5. Baseline methodology

5.1. Project boundary

16. The project boundary is the physical, geographical site of the efficient devices that utilize biomass.

5.2. Additionality

17. For the specific case of this methodology, additionality is demonstrated using one of the options below:

5.2.1. Option 1 (Positive list)

18. Demonstrate ex ante that the penetration[3] of high efficiency biomass fired devices (e.g. energy efficient cookstoves [4]) is equal to or less than 5 per cent of the technologies/measures providing similar services in the region[5] in order to be considered as automatically additional.

19. The penetration shall be determined using one of the following options:

    (a) Official statistics or reports, relevant industry association reports or peer-reviewed literature;

    (b) Results of a sampling survey conducted by project participants or a third party as per the latest version of "Standard: Sampling and surveys for CDM project activities and programme of activities" covering technologies/measures providing similar services as the project technology/measure;

20. To determine the penetration using the above paragraph, the most recent data available at the time of submission of the CDM-PDD or CDM-CPA-DD for validation/inclusion, shall be used, and the data vintage used shall not include data older than three years prior to: (a) the start date of the CDM project activity; or (b) the start of validation/inclusion, whichever is earlier.

5.2.2. Option 2

21. Demonstrate additionality by applying the "TOOL21: Demonstration of additionality of SSC project activities".

5.2.3. Option 3

22. Demonstrate additionality by applying the "TOOL19: Demonstration of additionality of microscale project activities".

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[3] Refers to proportion of stock of functional equipment at the user end; also termed as market saturation.

[4] In accordance with paragraph 3, consider all single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 per cent or higher.

[5] Region/ Applicable geographical area - should be the entire host country. If the project participants opt to limit the applicable geographical area to a specific geographical area (such as province, region, etc.) within the host country, then they shall provide justification on the essential distinction between the identified specific geographical area and rest of the host country.

5.3. Emission reductions

23. It is assumed that in the absence of the project activity, the baseline scenario would be the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices.

Box 3. Non-binding best practice example 3

Following criteria may be used to determine if stoves under consideration belong to the same generic stove model (e.g. for the purpose of surveys):

- If similarity is demonstrated for input and output characteristics, the stoves can be considered to belong to the same generic stove model;
- If the stoves are manufactured to the same design by different producers comparable input/output characteristics may be determined as follows;
    - The comparability of the output characteristics may be determined through statistical hypothesis testing of efficiency;
    - The comparability of the input characteristics may be assumed if stoves are manufactured, based on the same product design and same or comparable materials and production processes including QA/QC system.

24. Emission reductions are calculated as:

$$ER_y = \sum_i \sum_j ER_{y,i,j} - LE_y \quad \text{Equation (1)}$$

Where:

i	=	Indices for the situation where more than one type of project device is introduced to replace the pre-project devices[6]
j	=	Indices for the situation where there is more than one batch of project device
ER_y	=	Emission reductions during year *y* in t CO_2e
$ER_{y,i,j}$	=	Emission reductions by project device of type *i* and batch *j* during year *y* in t CO_2e
LE_y	=	Leakage emissions in the year *y*

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{\text{~~yo~~},i,j} \times n_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel} \quad \text{Equation (2)}$$

[6] For example, in some instances, full replacement of the pre-project device would require the implementation of more than one project device (e.g. one stove suitable for cooking and the other stove suitable for cooking/boiling water).

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per cookstove device of type *i* and batch *j* during year *y*
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (fNRB) [7]
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected\_fossilfuel}$	=	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers.
$N_{y0,i,j}$	=	Number[8] of project devices of type *i* and batch *j* commissioned ~~operating during year y~~
$n_{y,i,j}$	=	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y* (fraction)
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year *y* when applying equations 7 and 9 (fraction). Use 1.0 in other cases.

25. With regard to emission factor for the substitution of non-renewable woody biomass by similar consumers, either the default regional[9] values in table 2 below or a value calculated from Equation (3) may be used.

Table 2. Default regional values of the fossil fuel emission factor (CO_2 and non-CO_2 GHG emissions)

	Fossil fuel emission factor (t CO2e/TJ) incl. CH_4 and N_2O emissions
Middle East and North Africa	63.9
East Asia and the Pacific	85.7
Europe and Central Asia	57.8
Latin America and the Caribbean	68.6
South Asia	64.4
Sub-Saharan Africa	73.2

[7] Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/methodologies/standard_base/index.html>.

[8] Project devices may be commissioned in batches. See paragraph 15(a).

[9] Refer to Appendix 1 for the definition of the regions which is primarily based on the "developing regions" classification used by the United Nations Development Programme but tailored to the purpose of this CDM methodology (Retrieved on 27.11.19 from <http://hdr.undp.org/en/content/developing-regions>).

26. Project participants may estimate the emission factor for the substitution of non-renewable woody biomass by similar consumers[10] for their project or PoA by applying equation (3) below

$$EF_{projected\_fossil\ fuel} = \sum_j \{x_j \times (EF_{FF,j,CO2} + EF_{FF,j,CH4} \times GWP_{CH4} + EF_{FF,j,N2O} \times GWP_{N2O})\} \quad \text{Equation (3)}$$

Where:

x_j	=	Percentage share of fossil fuel use[11] (a fraction representing the share of fossil fuel type *j* in total fossil fuel used in the region/country or project area for cooking)
$EF_{FF,j,CO2}$	=	CO_2 emission factor for the fossil fuel *j.* Use a value in the table 3 below (t CO_2/TJ)
$EF_{FF,j,CH4}$	=	CH_4 emission factor for the fossil fuel *j.* Use a value in the table 3 below (t CH_4/TJ)
$EF_{FF,j,N2O}$	=	N_2O emission factor for the fossil fuel *j.* Use a value in the table 3 below (t N_2O/TJ)
GWP_{CH4}	=	Global Warming Potential of CH_4 valid for the commitment period
GWP_{N2O}	=	Global Warming Potential of N_2O valid for the commitment period

Table 3. Default emission factors (kg of GHG per TJ on a Net Calorific Basis)

Fuel	Default CO_2 Emission Factor	Default CH_4 Emission Factor	Default N_2O Emission Factor
Kerosene	71,900	10	0.6
Liquefied Petroleum Gases (LPG)	63,100	5	0.1
Coal	94,600	300	1.5

***Source*:** Table 2.5, Chapter 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories

27. The value of fNRB shall be calculated using either of the following two options:

(a) **Ex ante:** the fNRB value is determined once at the validation stage, thus no monitoring and recalculation of the fNRB value during the crediting period is required;

[10] The use of electricity together with the related grid emission factor shall be considered unless its share is less than 5%, in which case it may be disregarded for calculation of the fuel emission factor.

[11] For example, percentage share of kerosene, LPG and coal in total fossil fuel used in the country X is 10%, 70% and 20%, then the parameter value for x_j should be 0.1, 0.7 and 0.2 respectively.

(b) **Ex post:** the fNRB,y value is determined for the year "y" in the crediting period, requiring the fNRB value to be updated annually, following a consistent calculation procedure throughout the crediting period.

28. $B_{y,savings,i,j}$ due to implementation of efficient thermal devices is estimated as per any of the following options:

29. Option 1: Thermal Energy Output (TEO):

$$B_{y,savings,i,j} = \frac{HR_{y,i,j}}{NCV_{biomass}} \times \left(\frac{1}{\eta_{\text{old,i,j}}} - \frac{1}{\eta_{new,i,j}} \right) \quad \text{Equation (4)}$$

Where:

$HR_{y,i,j}$	=	~~Useful~~ Thermal energy output delivered per project device *i* in batch *j* during year *y* (TJ)
$\eta_{old,i,j}$	=	Efficiency of the old devices being replaced by project devices of type *i* and batch *j*
$\eta_{new,i,j}$	=	Efficiency of the project device *i* and batch *j*

30. The ~~useful~~thermal energy output shall be calculated based on the rated capacity of the project device multiplied by the number of utilization hours:

$$HR_{y,i,j} = HC_{i,j} \times t_{y,i,j} \times 0.0000036 \quad \text{Equation (5)}$$

Where:

$HC_{i,j}$	=	Rated thermal capacity as per manufacturer specification (kW)
$t_{y,i,j}$	=	Number of hours of utilization of the device during the year *y*
0.0000036	=	Factor to convert kWh to TJ

Box 4. Non-binding best practice example 4

Utilization hours for cookstoves

As per Data / Parameter table 13, the number of utilization hours shall be estimated in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities".

Considering that baseline emissions are highly sensitive to the value of utilization hours (i.e. By,saving under Option 1: Thermal Energy Output (TEO)), the project proponent should take due care to ensure that survey results are reliable, by avoiding any possibilities for bias in the design and implementation of the survey.

A questionnaire-based survey to determine the number of hours of utilization of the device during the year y is eligible, as long as the survey design and implementation comply with the requirements of the "Standard for sampling and surveys for CDM project activities and programme of activities".

To ensure accurate monitoring of the utilization hours, it is recommended to use measurement devices, such as Stove Use Monitors, in a sample of households/users, as this is a more accurate method of monitoring utilization hours (see section 9.2 of "Guideline: Sampling and surveys for CDM project activities and programmes of activities").

If CMEs/PPs choose to use a questionnaire-based survey, the design of the questionnaire should take into account various factors that may affect the number of utilization hours such as the types of institutions/households (e.g. schools, hospitals, prisons), their business hours, the number of meals prepared (e.g. day school, boarding school), the types of food prepared. Stove usage records or fuel purchase records of the institutions/households should be taken into account during the survey or used to cross check the results. Per capita consumption of fuel wood may also be useful for cross checking.

31. Option 2: kitchen performance test (KPT):

$$B_{y,savings,i,j} = B_{old,i,j} - B_{new,KPT,i,j} \quad \text{Equation (6)}$$

Where:

$B_{old,i,j}$	=	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate ~~useful~~ thermal energy equivalent to that provided by the project device type *i* and batch *j* (tonnes/year)
$B_{new,KPT,i,j}$	=	Annual quantity of woody biomass used in tonnes per project device of type *i* and batch *j*, measured as per the KPT protocol (tonnes/year). The KPT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the KPT Protocol listed by Clean Cooking Alliance (See <https://www.cleancookingalliance.org/technology-and-fuels/testing/protocols.html>)

32. Option 3: water boiling test (WBT):[12]

$$B_{y,savings,i,j} = B_{old,i,j} \times (1 - \frac{\eta_{old,i,j}}{\eta_{new,i,j}}) \quad \text{Equation (7)}$$

$$B_{y,savings,i,j} = B_{y=1,new,i,j,survey} \times (\frac{\eta_{new,i,j}}{\eta_{old,i,j}} - 1) \quad \text{Equation (8)}$$

Where:

$B_{y=1,new,i,j,survey}$	=	Quantity of woody biomass used by project devices in tonnes per device of type *i* and batch *j* (tonnes)

33. Option 4: controlled cooking test (CCT):

$$B_{y,savings,i,j} = B_{old,i,j} \times (1 - \frac{SC_{new,i,j}}{SC_{old}}) \quad \text{Equation (9)}$$

Where:

SC_{old}	=	Specific fuel consumption or fuel consumption rate of the pre-project devices (t fuel/unit output or t fuel/hour)
$SC_{new,i,j}$	=	Specific fuel consumption or the fuel consumption rate of the devices of type *i* and batch *j* deployed as part of the project (t fuel/unit output or t fuel/hour)

34. The calculations in the equations above assume that there is only one device per household. Considering that baseline surveys or other methods may estimate the total consumption per household, an adjusted formula as below shall be used in case more than one project device is used in the household. For example, if 2 project devices are installed per household, 0.5 times the baseline woody biomass consumption per household ($B_{old,HH}$) is used as the total annual quantity of woody biomass that would have been used in the absence of the project activity in each device ($B_{old,i,j}$). Where more detailed data is available, e.g. the thermal capacity of the project devices and respective utilisation hours, a weighted average thermal output ($HR_{y,i,j}$) may be used to determine the savings of baseline consumption for each device.

$$B_{old,i,j} = B_{old,HH} \div N_{d,HH} \quad \text{Equation (10)}$$

$$B_{old,HH} = B_{old,p} \times N_{p,HH} \quad \text{Equation (11)}$$

[12] Based on whether $\eta_{new,i,j}$ or $B_{y=1,new,ij,survey}$ is used for monitoring, either equation (7) or (8) may be used respectively.

Where:

$B_{old,HH}$	=	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate ~~useful~~ thermal energy equivalent to that provided by the project devices (tonnes/household/year)
$N_{d,HH}$	=	Number of project devices per household (number)
$B_{old,p}$	=	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate ~~useful~~ thermal energy equivalent to that provided by the project devices (tonnes/person/year)
$N_{p,HH}$	=	Average number of persons per household (number)

35. Where charcoal is used as the fuel by baseline (old) or project (new) devices, the quantity of woody biomass shall be determined by using a default wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis).[13] Alternatively, credible local conversion factors determined from a field study or literature may be applied. However, the conversion factor should not be more than 8.

36. The lifetime of each type of the project devices shall be documented in the PDD based on manufacturer's specification.

[13] Refer to:<http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf>.The term 'wet basis' assumes that the wood is 'air-dried' as is specified in the IPCC default table.

Box 5. Non-binding best practice example 5

CDM project standard for project activities require that the project participants (PPs) describe the proposed CDM project activity in the PDD, including the information on the age and average lifetime of the equipment based on the manufacturer's specifications and industry standards.

Therefore, regardless of the option chosen in paragraph 37 of this methodology, the PPs shall provide this information.

Furthermore, the methodology allows as an option, biennial (once in 2 years) surveys, to determine the retention rates of the stoves, and as per paragraph 27 of the "General guidelines for SSC CDM methodologies (version 22.1)", it is also allowed to apply the result of the surveys for monitoring period up to 12 months after the date of the survey if the average lifetime of the units is known and is four years or more.

Lack of information on expected lifetime of the project stoves may therefore add uncertainties to retention rates and other parameters the project needs to monitor.

Project proponents therefore should choose a stove design that has predictable performance (i.e. proven to be efficient and durable under field conditions) irrespective of whether the stove is constructed in-situ or fabricated in factory.

If information on average stove performance from the project region is not available, information from another region with comparable socioeconomic conditions may be used. Choosing options 37 (b) to 37 (d) of the methodology will not obviate the requirement to provide information on lifetime (e.g. choosing option 37 (b) will entail demonstration, through application of relevant standards and guidelines, that the chosen stoves can be operated and maintained such that there is no drop in the efficiency during the entire lifetime of the device.)

37. The loss in efficiency of the project devices *i* in each batch *j* due to aging shall be accounted during the monitoring period *y*. For Option 1 and Option 3 (as specified in paragraphs 29-33), the Project participant may choose any option below to account for the loss in efficiency (for Option 3) or decrease in the capacity (for Option 1); the option should be identified and fixed ex ante in the PDD at the time of registration. However, when Option 2: kitchen performance test (KPT) or Option 4: controlled cooking test (CCT) is used, the requirements below are not applicable because any annual changes of the quantity of woody biomass used and any annual changes in specific fuel consumption will be captured by the KPT and CCT respectively[14].

    (a) A default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent shall be applied through the life span of the project device[15]. For example, if the life span of project device is five years and project device has an efficiency of 30 per cent at commissioning then a 2 per cent decrease in efficiency every year shall be applied; or

[14] The KPT shall be conducted at representative households where the ICS has been regularly used since the beginning of the project activity in order to reflect the typical condition of the improved devices after aging. Similarly, the CCT shall be used to test the specific fuel consumption of representative devices that have been regularly in operation and subject to the regular process of replacement/maintenance introduced by the project activity since its beginning.

[15] If the efficiency of the project devices falls below 20%, it is no longer eligible to be considered a project device.

Box 6. Non-binding best practice example 6

The underlying assumptions for this sub-pargraph are:

- The stove efficiency decreases linearly over time, i.e. at a constant rate which is equal to the difference between the initial and final efficiencies divided by the lifespan of the project device in number of years.

- The final value after the end of the life span will be set as 20%.

The example in the above sub-paragraph is considered for illustration as below, i.e. 30% efficiency of the stove at commissioning and terminal efficiency at the end of year 5 is 20 per cent is considered.

1st year (from Day 1 to Day 365): 30% as a constant value during the period,

2nd year (from Day 366 to Day 730): 28% as a constant value during the period,

3rd year (from Day 731 to Day 1095): 26% as a constant value during the period,

4th year (from Day 1096 to Day 1460): 24% as a constant value during the period,

5th year (from Day 1461 to Day 1825): 22% as a constant value during the period,

After Day 1826, project stoves are not more eligible for claiming ERs.

It is more accurate and conservative to consider a drop in efficiency throughout any given year of the crediting period, making the following with additional assumptions:

- The average efficiency of a given year is applied for the entire year, calculated as the mid-value between the efficiency values at the start and end of that year.

- Efficiency at any other point in the year can be linearly interpolated.

- The decay of efficiency starts on day 1 of the operation, thus the average efficiency of year 1 does not equal the initial efficiency; rather, it is equivalent to the average efficiency for year 1.

This means, for example, applicable value for stoves that operated throughout year 1 (i.e. day 1 to day 365 from the start date of the crediting period) will be the average of 40 per cent on day 1 and 36 per cent on day 365, i.e. 38 per cent. If some stoves have operated only for the part of the year 1 owing to the time required for distribution, then a daily drop in efficiency of 0.011 (= 4 / 365) may be considered for the weighted average estimations. This may be more accurate and conservative estimation of emission reductions.

(b) Manufacturer of project devices shall confirm with technical justification based on certification by a national standards body or an appropriate certifying agent recognized by that body that no decrease in efficiency of project device is envisaged during the crediting period; or

(c) Determine[16] the rate of efficiency drop for a representative sample of the first batch of project device *i* in year *y* and assume that same rate of loss in efficiency applies to all other batches. In other words, it may be assumed that the degradation of efficiency measured in a representative sample of the first batch of project devices i apply to all subsequent batches. The efficiency of the project devices in the first

[16] Example: For the representative sample of Batch 1, if the efficiency of a new project device is 30% and at the end of Year 1, the efficiency is monitored to be 29%; the loss rate is (30%-29%)/1=1%. Then this 1% loss rate is to be assumed to be applicable for all the devices in the first batch and subsequent batches for first year of operation.

batch has to be monitored annually through representative samples and this rate of loss in efficiency may be applied correspondingly to all batches;

(d) Determine the loss in efficiency annually from a representative sample of each batch and use the actual loss rate that is measured.

38. It is allowed to replace the project cookstoves whose lifetime has ended with new project cookstoves for the existing projects/CPAs as long as they are replaced within the crediting period. However, creating a new CPA or a new project for the same purpose is not eligible. If the life span of devices is less than the crediting period, it shall be demonstrated that the devices shall be replaced after the life span has ended. In such cases, if it cannot be demonstrated that the project devices will be replaced with new devices, no emission reductions can be claimed beyond the life span of the project devices.

5.4. Leakage

39. Leakage related to the non-renewable woody biomass saved by the project activity shall be assessed based on ex post surveys of users and the areas from which this woody biomass is sourced (using 90/30 precision for a selection of samples). The potential source of leakage due to the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources shall be considered. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass by the non-project households/users, that is attributable to the project activity, then $B_{old,i,j}$ is adjusted to account for the quantified leakage. Alternatively, $B_{y,savings,i,j}$ is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

40. Project activities switching from baseline device using firewood to efficient project device using charcoal or switching from firewood to efficient project device using processed biomass (briquette, pellets, and woodchips) shall take into account the leakage effects related to the charcoal or processed biomass production.

41. A default value of 0.030 t CH_4/t charcoal may be used in accordance with “AMS-III.BG.: Emission reduction through sustainable charcoal production and consumption”.

5.5. Data and parameters not monitored

42. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter table 1.

Data / Parameter:	x_j
Data unit:	Fraction
Description:	Percentage share of fossil fuel use (a fraction representing the share of fossil fuel type *j* in total fossil fuel used in the region/country or project area for cooking)
Source of data:	Published literature, official reports or statistics, surveys
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$B_{old,p}$
Data unit:	tonnes/person/year
Description:	Annual quantity of woody biomass that would have been used per person in the household in the absence of the project activity to generate ~~useful~~ thermal energy equivalent to that provided by the project devices
Source of data:	Where applicable a value from a standardised baseline may be used as an alternative to the default value provided
Measurement procedures (if any):	Determined ex ante using one of the following options: (a) A default value of 0.5 tonnes/capita per year[17]. ~~may be used~~. This option is limited to household project devices (not eligible for oven and dryers). Also, if project proponents wish to use the default value for insitutions (e.g. schools, prisons), the value should be adjusted, based on the number of meals cooked[18].; (b) Historical data or a sample survey conducted as per the latest version of the "Standard: Sampling and surveys for CDM project activities and programme of activities"; (c) Country or region specific values approved through the "procedure for development, revision, clarification and update of standardized baselines," which are available on the CDM website <http://cdm.unfccc.int/methodologies/standard_base/index.html>
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$N_{p,HH}$
Data unit:	Number
Description:	Average number of persons served per household prior to project implementation
Source of data:	Established ex ante prior to project implementation based on records of households served by the project
Measurement procedures (if any):	
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	$B_{old,HH}$
Data unit:	tonnes/household/year

[17] Refer to "Annex 5 - Information note on the rationale for default factors used in AMS-I.E. and AMS-II.G." of the SSC WG 42 meeting report.

[18] For example, in case of day schools, only one meal may be prepared by schools and provided to students and staff, except school holidays.

Description:	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate ~~useful~~ thermal energy equivalent to that provided by the project devices
Source of data:	This parameter shall be determined ex ante
Measurement procedures (if any):	Use one of the following options: 1. $B_{old,p}$ times $N_{p,HH}$ or; 2. Based on the historical data or a sample survey conducted as per the latest version of "sampling and surveys for CDM project activities and programme of activities". If the monitoring period is shorter or longer than one year, the result may be extrapolated for the monitoring period
Any comment:	The value may be derived, based on the historical data or a sample survey conducted as per the latest version of "sampling and surveys for CDM project activities and programme of activities". Paragraph 23 of "General guidelines for SSC CDM methodologies (version 22.1)" provides guidance on the use of data including historic data to derive parameter values. Values used in other schemes (e.g. registered Gold Standard carbon offset projects) from the same region are acceptable when it is demonstrated to be suitable for use as per the procedures indicated in the above general guidelines

Data / Parameter table 5.

Data / Parameter:	$B_{old,i,j}$
Data unit:	tonnes/year
Description:	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate ~~useful~~ thermal energy equivalent to that provided by the project device type *i* and batch *j*
Source of data:	This parameter shall be determined ex ante
Measurement procedures (if any):	$B_{old,HH}$ divided by $N_{d,HH}$
Any comment:	$B_{old,i,j}$ equals $B_{old,HH}$ when only one project device per household is distributed. For $N_{d,HH}$, please refer to Data / Parameter table 23

Data / Parameter table 6.

Data / Parameter:	$f_{NRB,y}$
Data unit:	-
Description:	Fraction of woody biomass saved by the project activity during year *y* that can be established as non-renewable biomass
Source of data:	-
Measurement procedures (if any):	As per the "TOOL30: Calculation of the fraction of non-renewable biomass"
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	SC_{old}
Data unit:	t fuel/unit output or t fuel/hour
Description:	Specific fuel consumption or fuel consumption rate of the pre-project devices
Source of data:	
Measurement procedures (if any):	1. Specific fuel consumption or fuel consumption rate of the pre-project devices, that is fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively. Specific fuel consumption or fuel consumption rate are to be determined using the CCT protocol carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the CCT Protocol listed by Clean Cooking Alliance (See https://www.cleancookingalliance.org/technology-and-fuels/testing/protocols.html)). 2. Use weighted average values if more than one type of device is being replaced (taking the amount of woody biomass consumed by each device as the weighting factor). 3. When the CCT is conducted on a sample basis, the sampling requirements indicated in section 6.2 and guidance provided in the "Standard for sampling and surveys for CDM project activities and programme of activities" shall be followed
Any comment:	-

Data / Parameter table 8.

Data / Parameter:	HCi,j
Data unit:	kW
Description:	Rated capacity for delivering heat as per manufacturer specification (kW)
Source of data:	
Measurement procedures (if any):	The ~~useful~~ thermal energy shall be calculated based on the rated capacity of the project device multiplied by the number of utilization hours. Refer equation 5
Any comment:	-

Data / Parameter table 9

Data / Parameter:	$\eta_{old,i,j}$
Data unit:	~~(i) Default 0.1 or 0.2 (please see details below);~~ ~~(ii) Establish prior to start of implementation based on survey~~ Fraction

Description:	Efficiency of pre-project device~~, which is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; for other types of devices, a default value of 0.2 may be optionally used. Use weighted average values (taking the amount of woody biomass consumed by each device as the weighting factor) if more than one type of device is being replaced~~
Source of data:	-
Measurement procedures (if any):	The parameter may be established based on a representative sample survey of the pre-project devices and fixed ex ante (i.e. there is no need to determine baseline efficiency for each individual household when including in the project activity database). The survey is to be conducted in line with the "Standard for sampling and surveys for CDM project activities and programmes of activities". The representative sampling survey may ask whether the pre-project device is a traditional three-stone fire or another conventional device with no improved combustion air supply or flue gas ventilation. In that case, it is possible not to conduct efficiency tests and to use the following default efficiency values to calculate the weighted average. (i) 0.1 for a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; (ii) 0.2 for other types of devices. Conducting efficiency tests on pre-project devices is not a mandatory requirement under this methodology. Furthermore, project participants may also conservatively assume that the efficiency of all pre-project devices is 0.2 in which case there is no need to conduct a survey to determine the weighted average efficiency referred above.
Monitoring frequency:	~~Fixed for each individual household when included in the project activity database~~ This parameter may be established prior to implementation of a project activity
QA/QC procedures:	-
Any comment:	-

6. Monitoring methodology

43. During project activity implementation, the following data shall be recorded:

(a) Number of new devices distributed under the project activity, identified by the type of devices and the date of commissioning (See Data / Parameter table 21 and 22);

(b) Data to unambiguously identify the recipient of the new devices distributed under the project activity (e.g. name, address, phone number).

44. In order to assess the leakage described in section 5.4 above, monitoring shall include data on the amount of woody biomass saved under the project activity that is used by non-

project households/users (who previously used renewable energy sources). Other data on non-renewable woody biomass use required for leakage assessment shall also be collected.

45. Relevant parameters shall be monitored and recorded during the crediting period as indicated in section 6.1 below. The applicable requirements specified in the "General guidelines for SSC CDM methodologies" are also an integral part of the monitoring guidelines specified below and therefore shall be followed by the project participants.

6.1. Data and parameters monitored

Data / Parameter table 10.

Data / Parameter:	$N_{y0,i,j}$
Data unit:	-
Description:	Number of commissioned project devices of type *i* and batch *j* ~~operating during year y~~
Source of data:	Monitoring
Measurement procedures (if any):	As per paragraph 43 ~~Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision. A discount shall be applied based on the percentage of devices operational as determined by the sample survey, e.g. if survey shows that 10% of the devices is non-operating, an adjustment factor of 0.9 shall be applied to number of project devices commissioned in a particular batch. Separate samples shall be taken for each batch~~
Monitoring frequency:	~~At least once every two years (biennial)~~
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 11.

Data / Parameter:	$n_{y,i,j}$
Data unit:	-
Description:	Proportion of commissioned project devices of type *i* and batch *j* ($N_{0,i,j}$) that remain operating in year *y* (fraction)
Source of data:	Monitoring
Measurement procedures (if any):	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision. Separate samples shall be taken for each batch
Monitoring frequency:	At least once every two years (biennial)
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 12.

Data / Parameter:	μ_y
Data unit:	Fraction
Description:	Adjustment to account for any continued use of pre-project devices during the year *y*
Source of data:	When applying equations 7 and 9, it is a fraction based on monitoring results. In other cases (i.e. applying equations 4, 6 and 8), use 1.0
Measurement procedures (if any):	This parameter should be monitored using one of the following methods: 1. If the pre-project devices are decommissioned and no longer used, as determined by the monitoring survey its value is 1.0. If both the project devices and pre-project devices are used together, measurement campaigns shall be undertaken using data loggers such as stove utilization monitors (SUMs) which can log the operation of all devices (recording the situation of the device being used or not during any day '*d*' of the measurement campaign) in order to determine the average device utilization intensity (to establish the relative share of the usage of the devices). The measurement campaign shall be conducted in at least 10 randomly selected participant households of the project activity or the component project activity (CPA) for at least 90 days during the year *y*. If seasonal variation is observed, the average value determined through the campaign shall be annualised taking into account seasonal variation of device utilization. 2. Alternatively, surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire. The surveys should be designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 pre-project devices per household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. Another example would be the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75. Where a more precise data is available, i.e. the thermal capacity of the project and pre-project devices and respective utilization hours, a weighted average adjustment factor may be used
Monitoring frequency:	At least once every two years (biennial)
QA/QC procedures:	-
Any comment:	1. If equation (8) under option 3 (WBT) is used combined with direct measurement of Biomass new, then μ_y may be assumed as 1.0. For subsequent years, the value of 1.0 may be applied, only if it

	can be demonstrated through either measurement campaign or questionnaire survey for a sample of households established according to the sampling standard that pre-project devices are not used in parallel with the project devices during the monitoring period. This is required even in cases where pre-project devices were demonstrated to be decommissioned ex-ante in order to ensure that such devices and alike have not been reintroduced. Otherwise, measurement campaign or equivalent shall be undertaken to determine this parameter. Project participants may choose to directly monitor the biomass consumption annually in the project device" instead of determining μ_y by measurement campaign or survey in a similar manner as the measurement of $B_{y=1,new,i,j,survey}$. 2. When the data loggers are used, the days when only project devices or only pre-project devices are used will be attributed accordingly. The days where both devices have been used, if the data loggers are able to detect and record the time each device has been used (e.g. in hours), the share in the total duration of utilization will be used to attribute a fraction of this day to one or to the other device. Alternatively, if the data loggers are not able to determine the duration of the utilization, but only the situation of the device being on or off (i.e. used or not used during that day), the share of 50:50 may be used

Data / Parameter table 13.

Data / Parameter:	$t_{y,i,j}$
Data unit:	Number of hours
Description:	Number of hours of utilization of the device during the year *y*
Source of data:	-
Measurement procedures (if any):	The rated capacity shall be based on the manufacturer specification. The number of utilization hours shall be estimated at least once every two years (annually or biennially). The biennial survey shall follow a 95 per cent confidence interval and a 10 per cent margin of error in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities"
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 14.

Data / Parameter:	$\eta_{new,i,j}$
Data unit:	Fraction
Description:	Efficiency of the device of each type *i and* batch *j* implemented as part of the project activity
Source of data:	-

Measurement procedures (if any):	Efficiency shall be measured/estimated as per the following: 1. The efficiency of the project devices shall be based on certification by a national standards body or an appropriate certifying agent recognized by that body. 2. Alternatively, manufacturer specifications on efficiency based on water boiling test (WBT) may be used. The WBT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the WBT Protocol[19,20] or ISO 19867-1 listed by Clean Cooking Alliance (See https://www.cleancookingalliance.org/technology-and-fuels/testing/protocols.html)). For 1 and 2 above, the sampling test of stoves by such certification bodies/agents or manufacturers shall be conducted following a 90/10 precision in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities". 3. However, the following simplified approach may be used, when the efficient cookstoves are produced by a manufacturer with a recognized management system in place (e.g. ISO certification) to ensure that the individual equipment produced do not vary beyond the range of acceptance limits (e.g. characteristics such as materials, critical dimensions): (i) Conduct a sample test on three cookstoves with three tests conducted for each stove. The test can be carried out by project proponents by themselves or stove manufacturers; (ii) If the standard deviation of the nine test results indicated above is very small and 90/10 precision requirement is met (in this case, the value of the t-distribution for 90 per cent confidence shall be used instead of Z value), the efficiency determined is acceptable, otherwise more sample tests would be required until 90/10 precision is met. 4. For project activities that implement cookstoves with saucepan capacities both greater than 30 L as well as smaller than 30 L, the most conservative value among the results of efficiency tests conducted (i.e. the least efficiency determined) on cookstoves of sizes equal to or smaller than 30 L may be used for stoves that are larger than 30 L in lieu of actual testing of the efficiency of stoves that are above 30 L capacity. The simplified approach above may also be used to comply with eligibility requirements

[19] PPs/CMEs may conduct only the first two phases of the stove tests: cold-start high-power phase and hot-start high-power phase (not including the simmer phase) for calculation of the high-power thermal efficiency.

[20] The guidance provided in the WBT protocol may be followed for calibration of testing equipment.

	under paragraph 3 and can be used only if the following conditions are met: (i) Stoves that can hold saucepans that are larger than 30 L are from the same manufacturer[21] and of similar design (e.g. with respect to construction materials including insulation material, placement of grate, cooking vessels and if applicable chimney) as compared to the stoves that are smaller than 30 L; (ii) Project proponents should demonstrate that comparable repair and maintenance practices are undertaken on all project stoves, irrespective of the size
Monitoring frequency:	(i) Recorded at the time of commissioning/distribution; (ii) Adjusted for the loss of efficiency as paragraph 37
QA/QC procedures:	-
Any comment:	Follow provisions in paragraph 37 to account for loss in efficiency of the project devices

Data / Parameter table 15.

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne
Description:	Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in project devices
Source of data:	-
Measurement procedures (if any):	IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in project device is also woody biomass. If briquette is used as project fuel, NCV shall be measured annually
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 16.

Data / Parameter:	$SC_{new,i,j}$
Data unit:	t fuel/unit output or t fuel/hour
Description:	Specific fuel consumption or fuel consumption rate during year *y* of the device(s) of type *i* deployed as part of the project that is fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour respectively with the age *a*
Source of data:	-

[21] For in-situ constructed stoves, show that the prefabricated components are sourced from the same supplier.

Measurement procedures (if any):	As per paragraph 33, using the controlled cooking test (CCT) procedure. The CCT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the CCT Protocol listed by Clean Cooking Alliance (See https://www.cleancookingalliance.org/technology-and-fuels/testing/protocols.html)). When the CCT is conducted on a sample basis, the sampling requirements indicated in section 6.2 and guidance provided in the "Standard for sampling and surveys for CDM project activities and programme of activities" shall be followed
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 17.

Data / Parameter:	$f_{NRB,y}$
Data unit:	-
Description:	Fraction of woody biomass saved by the project activity during year *y* that can be established as non-renewable biomass
Source of data:	-
Measurement procedures (if any):	As per the "TOOL30: Calculation of the fraction of non-renewable biomass"
Monitoring frequency:	Yearly, if project proponents opt for annual monitoring instead of fixing the value ex ante at the beginning of each crediting period
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 18.

Data / Parameter:	$B_{y=1,new,i,j,survey}$
Data unit:	Tonnes
Description:	Quantity of woody biomass used by project devices in tonnes per device of type *i*
Source of data:	Sample survey of end user or direct measurement at each end user locations

Measurement procedures (if any):	Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied: Pre-project devices have been completely decommissioned and only efficient project device(s) are exclusively used in the project households; If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass
Monitoring frequency:	First year of installation
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 19.

Data / Parameter:	$B_{new,KPT,i,j}$
Data unit:	Tonnes/year
Description:	Annual quantity of woody biomass used in tonnes per project device of type *i*
Source of data:	Sample survey
Measurement procedures (if any):	Measured as per the KPT protocol. The KPT shall be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the KPT Protocol listed by Clean Cooking Alliance (See https://www.cleancookingalliance.org/technology-and-fuels/testing/protocols.html)). The days selected for measurement of fuel consumption shall take into account seasonal/weekly variations in fuel consumption, or else the data from the measurement campaign shall be extrapolated in order to take into account the seasonal pattern
Monitoring frequency:	Annual monitoring of the quantity of woody biomass used in tonnes per project device of type *i* and batch *j*
QA/QC procedures:	-
Any comment:	-

Box 7. Non-binding best practice example 7

The validity of the results of the annual KPT survey

- The results of the annual KPT survey may be applied both for the period before the survey date and for the period after the survey date, but the gap between consecutive annual KPT surveys (i.e. the gap between the start date of the first KPT survey and the start date of the second KPT survey) shall not be more than 12 months.
- If this is not the case, i.e. if the period of time between surveys is longer than 12 months, then a CME may request a temporary deviation from the monitoring plan by following the procedure described in section 6.3 of the ”CDM Project Cycle Procedure for PoAs”.

Data / Parameter table 20.

Data / Parameter:	**Life Span**
Data unit:	Number of years
Description:	The operating life time of the project device. The life span should be reported in cases where the PPs are opting to account the efficiency loss as per paragraph 37
Source of data:	Manufacturer (certified by a national standards body or an appropriate certifying agent recognized by that body)
Measurement procedures (if any):	
Monitoring frequency:	Fixed and recorded at the time of commissioning/distribution
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 21.

Data / Parameter:	**Date of commissioning of batch *j***
Data unit:	Date
Description:	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Source of data:	Internal records
Measurement procedures (if any):	
Monitoring frequency:	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch
QA/QC procedures:	-
Any comment:	To be reported in the monitoring report

Data / Parameter table 22.

Data / Parameter:	**Date of commissioning of project device *i***
Data unit:	Date
Description:	Actual date of commissioning of the project device

Source of data:	Internal records
Measurement procedures (if any):	-
Monitoring frequency:	Fixed and recorded at the time of commissioning/distribution
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 23.

Data / Parameter:	$N_{d,HH}$
Data unit:	Number
Description:	Number of project devices distributed per household
Source of data:	Internal records
Measurement procedures (if any):	-
Monitoring frequency:	Recorded at the time of commissioning/distribution of project devices
QA/QC procedures:	-
Any comment:	The results of ex post usage/monitoring survey should not be used to determine the value

6.2. Representative sampling methods

46. A statistically valid sample of the locations where the devices are deployed, with consideration, in the sampling design, of occupancy and demographic differences can be used to determine parameter values used to calculate emission reductions, as per the relevant requirements for sampling in the *"*Standard for sampling and surveys for CDM project activities and programmes of activities*".* When biennial inspection is chosen a 95 per cent confidence interval and a 10 per cent margin of error shall be achieved for the sampling parameter. On the other hand, when the project proponent chooses to inspect annually, a 90 per cent confidence interval and a 10 per cent margin of error shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/10 precision are not achieved, the lower bound of the 90 per cent or 95 per cent confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/10 precision.

47. Efficiency of devices may be monitored in a common survey with other monitoring parameters; therefore, a random sub-sample within the common survey can be taken for which stove efficiency is tested, as long as the required precision for stove efficiency is achieved.

6.3. Project activity under a programme of activities

48. The use of this methodology in a project activity under a programme of activities is legitimate if the following leakages are estimated and accounted for, as required on a sample basis using a 90/30 precision for the selection of samples:

    (a) Use of non-renewable woody biomass saved under the project activity to justify the baseline of other CDM project activities can also be a potential source of leakage. If this leakage assessment quantifies a portion of non-renewable woody biomass

saved under the project activity that is then used as the baseline of other CDM project activities then $B_{old,i,j}$ is adjusted to account for the quantified leakage;

(b) Increase in the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines can also be a potential source of leakage. If this leakage assessment quantifies an increase in the use of non-renewable woody biomass outside the project boundary then $B_{old,i,j}$ is adjusted to account for the quantified leakage;

(c) As an alternative to subparagraphs (a) and (b) $B_{old,i,j}$ can be multiplied by a net to gross adjustment factor of 0.95[22] to account for both leakages, in which case surveys are not required.

49. To determine the value of the fraction of non-renewable biomass (fNRB) to be applied in a Component Project Activity (CPA) of a POA, use one of the two options as follows: (a) Conduct local studies to determine the local fNRB value (sub national values)[23] as per the "TOOL30: Calculation of the fraction of non-renewable biomass"; or (b) Use default national values approved by the Board (see footnote 7)[24,25]. The choice of which option to use shall be made ex ante. However, a switch from a national value of fNRB (i.e. option (b)) to local values (i.e. option (a)) is permitted, under the condition that the selected approach is consistently applied to all CPAs.[26]

50. Monitoring approaches for $B_{y,savings,i,j}$[27] and values for parameters fNRB (when Option (a) in paragraph 48(c) is chosen) and the quantity of woody biomass $B_{old,i,j}$ may be determined either at the CPA level before the inclusion of the CPA or at the PoA level before the registration of the PoA-DD.

[22] Paragraph 39 and paragraph 48 of the methodology allow the use of a net to gross adjustment factor of 0.95 in lieu of conducting a survey to account for leakage emissions. In the case of a CPA opting to apply the adjustment factor, the adjustment factor is only applied once, i.e. either paragraph 39 or paragraph 48(c) is applied. Also, the adjustment factor does not need to be applied twice for option (a) and (b).

[23] If the project boundary covers the entire country, then it is permitted that studies be conducted at the national level to determine the fNRB value under option (a).

[24] In the absence of a national value, the default globally applicable fNRB value of 0.3 may be treated as national value.

[25] After registration of a PoA that applies the default conservative value of 0.30, if a national value is approved by the Board, CMEs may request a post-registration change to use that national value.

[26] The determination of fNRB of all CPAs under the PoA shall follow the option that is defined by the PoA-DD. This includes new CPAs to be included to the POA and the approach has to be consistent amongst all CPAs. The new fNRB value should be calculated as per Tool 30 and the value obtained by the tool may be applied irrespective of whether it is lower, equal or higher than the default value mentioned in the Tool.

[27] Any one of the four options in paragraphs 29 to 33 may be used for a particular CPA, but there should be no change in the chosen option during the crediting period.

51. If the generic CPA consists solely of units that qualify as “microscale CDM units”[28] as defined in the “TOOL19: Demonstration of additionality of microscale project activities”, the conditions to ensure that CPAs that will be included meet the small-scale or microscale thresholds and remain within those thresholds throughout the crediting period of the CPAs are not required.

[28] Refer to the latest vesion of TOOL19 on the CDM website. In accordance with version 9.0 of TOOL19, to qualify as microscale unit, it is required to demonstrated that: (a) energy savings at a scale of no more than 20 GWh per year is achieved; and (b) end users of the technology/measure are households, communities or SMEs; and (c) penetration of high efficiency biomass fired devices (e.g. energy efficient cookstoves) is equal to or less than 5 per cent of the technologies/measures (providing similar services) in the region.

Appendix 1. Definition of regions

1. The table below lists the NA-I countries into six regions primarily based on the definition of "developing regions" used by the United Nations Development programme <http://hdr.undp.org/en/content/developing-regions> but with some modifications for the purpose of this CDM methodology. This classification is for the limited purpose of determining a simple regional default value for fossil fuel emission factor (i.e. emission factor for the substitution of non-renewable woody biomass by similar consumers) for optional use by the project developers under equation 2 of this methodology.

Table 1. Classification for developing regions

Developing region	Countries
Middle East and North Africa	Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen, *Israel*
East Asia and the Pacific	Cambodia, China, Fiji, Indonesia, Kiribati, Democratic People's Republic of Korea, Lao People's Democratic Republic, Malaysia, Marshall Islands, Federated States of Micronesia, Mongolia, Myanmar, Nauru, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Viet Nam, *Cook Islands, Brunei Darussalam, Republic of Korea, Niue, Singapore*
Europe and Central Asia	Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Montenegro, Serbia, Tajikistan, The Republic of North Macedonia, Turkmenistan, Uzbekistan, *San Marino*
Latin America and the Caribbean	Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Plurinational State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Bolivarian Republic of Venezuela
South Asia	Afghanistan, Bangladesh, Bhutan, India, Islamic Republic of Iran, Maldives, Nepal, Pakistan, Sri Lanka
Sub-Saharan Africa	Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde,Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, Eswatini (Kingdom of), United Republic of Tanzania, Togo, Uganda, Zambia, Zimbabwe

Appendix 2. Non-binding survey questionnaire

1. Survey format A: Baseline fuel consumption pattern

1.1. General information[1]

Title of project activity/CPA/PoA	
Name of Surveyor	
Date of survey	mm/dd/yyyy
Period of measurements (for consumption rate)	mm/dd/yyyy to mm/dd/yyyy

1.2. Household profile[2]

Name (Household representative)	
Household size (total number of people)	
- Adult	
- Children	
Address	
Phone number (if available)	

1.3. Stove description prior to the project implementation[3]

(mark x with type of stove used)

"A three-stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. Without a grate or chimney".	
Any other type of stove	

[1] Selection of households should be based on a sampling plan.

[2] If the survey is done biennially, it may be designed to capture the results for each year separately (e.g. the survey may ask for the utilization hours for year 1 and for year 2 separately).

[3] An "X" shall be filled in in one of the two alternatives. If the stove does not have a chimney or a grate, then "X" should be filled out for "Any other type of stoves". Such a stove would then be considered an improved cookstove.

1.4. Household fuel consumption pattern prior to the project implementation[4]

How many meals did you prepare last week or last month?	Meals/week or month

1.4.1. Fuel use for cooking

	Yes/No	Quantity of usage	Unit
Charcoal			kg/month or year
Wood			kg/month or year
LPG			kg or Cylinders/month or year
Kerosene			Litres/month or year
Coal			kg/month or year
Electricity			kWh/month or year
Other fuels (explain)			

2. Survey format B: Project survey

2.1. General information[5]

Title of project activity/CPA/PoA	
Name of Surveyor	
Date of survey	mm/dd/yyyy
Period of measurements (for consumption rate)	mm/dd/yyyy to mm/dd/yyyy

2.2. Household profile

Name (Household representative)	
Household size (total number of people)	
- Adult	
- Children	
Address	
Phone number (if available)	

2.3. Household fuel consumption pattern post the project implementation

Cooking device	
Model name/number	
Unique ID	
Date of installation	mm/dd/yyyy
Do you use the project cookstove?	Yes/No

[4] In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms units mentioned above. In many places the volume of firewood (e.g. the volume capacity and level of filling of the transporting/storage room) is measured, not its weight. This very much depends on the local practice of measurement. The project participants should include such local measurement unit in the questionnaire. In some cases, the measurement unit could also be in terms of money spent on purchasing the fuel. Therefore, the project participant shall provide further guidelines for how the conversion of these reported values to required units (mass or volume) should be carried out (e.g. If a household uses a bag of charcoal every 10 days, then the monthly average can be calculated if the weight (or volume and bulk density) of the full bag can be determined.).

[5] Selection of households should be based on a sampling plan.

(Physically check the stove).[6]	
- If yes, have you used the stove regularly since you installed it?[7]	Yes/No
- If yes, is your stove in good condition?[8]	Yes/No
- If no, why did you stop using the stove?	
- How many meals did you prepare using project cookstove last week or last month?	Meals/week or month
Do you use your traditional (baseline) cookstove also?	Yes/No
- If yes, how many meals did you prepare using traditional (baseline) cookstove last week or last month?[9]	Meals/week or month
Do you use any other stove? (ICS etc.)[10]	Yes/No
If yes, list the types and number of other non-project stoves	
How many times a week do you use the non-project stoves?	
How much do you spend on fuel for cooking/type of cooking device in a week/month?	

2.3.1. Fuel use for cooking[11]

	Yes/No	Quantity of usage	Unit	Money spent on fuel/month/year
Charcoal			kg/month or year	
Wood			kg/month or year	
LPG			kg or Cylinders/month or year	
Kerosene			Litres/month or year	
Coal			kg/month or year	

[6] The question is to determine if the cookstove is currently in use, i.e. to address the parameter of "usage factor". Physical checks to verify the usage may be done by checking the conditions of stoves, e.g. warm to touch, ashes in grate, and soot on stove.

[7] The question is to determine if the cookstove has been continuously used.

[8] The project proponent may rephrase the question keeping in mind the objective, i.e. whether or not the project cookstove is in usable condition. If the project cookstove is not in usable condition, the PP shall exclude such stoves from project database of the whole crediting year and subsequent years. The PP may include such stoves again on replacing them with new cookstoves of similar efficiency.

[9] The question is to determine if the baseline stove is being used to account for project emissions.

[10] The question is to cross-check if the project cookstove is used for all cooking requirements. It may also detect the situation where a household is taking part in more than one project activity, avoiding double-counting.

[11] In many cases, the end-user might not be able to provide information on quantity of cooking fuel in terms units mentioned above. In many places the volume of firewood (e.g. the volume capacity and level of filling of the transporting/storage room) is measured, not its weight. This very much depends on the local practice of measurement. The project participants should include such local measurement unit in the questionnaire. In some cases, the measurement unit could also be in terms of money. Therefore, the project participant shall provide further guidelines for how the conversion of these reported values to required units (mass or volume) should be carried out (e.g. If a household uses a bag of charcoal every 10 days, then the monthly average can be calculated if the weight (or volume and bulk density) of the full bag can be determined).

	Yes/No	Quantity of usage	Unit	Money spent on fuel/month/year
Electricity			kWh/month or year	
Other fuels (explain)				

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Document information

Version	*Date*	*Description*
12.0	9 October 2020	MP 83 electronic consultation report 02, Annex 2 A call for public input will be issued for this draft document. Revision to include best practice examples for stove stacking.
11.1	5 June 2020	Editorial revisions to correct cross-references throughout the document.
11.0	28 November 2019	EB 105, Annex 8 Revision to: • Introduce regional default fossil fuel emission factors and an alternative for the project participant to calculate the fossil fuel emission factor, as explained in CDM-MP80-A16; • Clarify monitoring requirements; • Include non-binding best-practice examples; • Incorporate the responses to clarification requests: SSC_733, SSC_739, SSC_742, SSC_743, SSC_744, SSC_746, SSC_752, SSC_753, SSC_759 and SSC_760.
10.0	31 August 2018	EB 100, Annex 12 Revision to include simplified provision for automatic additionality (if market penetration is less than or equal to 5 percent).
09.0	1 November 2017	EB 97, Annex 11 Revision to: • Revise the emission factor of “substitution fuels likely to be used by similar users”; • Include an example survey form; • Clarify monitoring requirements; • Refer to the methodological tool “Calculation of the fraction of non-renewable biomass” (TOOL30).
08.0	22 July 2016	EB 90, Annex 13 Revision to include the procedures to quantify baseline woody biomass consumption for the entire household.
07.0	24 July 2015	EB 85, Annex 14 Revision to simplify the baseline emission equation, determination of efficiency and monitoring parameters.

Version	*Date*	*Description*
06.0	21 February 2014	EB 77, Annex 11 Revision to: • Introduce simplified approaches to determine the thermal efficiency of project devices; • Introduce default values for baseline fuel wood consumption.
05.0	23 November 2012	EB 70, Annex 30 Includes clarification on monitoring requirements under different options; and provides a provision of wood to charcoal conversion factor.
04.0	20 July 2012	EB 68, Annex 23 Includes a reference to the available country specific default values for fNRB and specifies requirements of using national or local fNRB values for CPAs under a PoA.
03	15 April 2011	EB 60, Annex 21 KPT for stove testing included, requirements for leakage estimation simplified, default net gross adjustment factor is included as an option to account for any leakages, emission factor for the projected fossil fuel revised, more options for sampling and survey included.
02	04 December 2009	EB 51, Annex 18 To include: (a) Default efficiency factors for baseline cookstoves; (b) Procedures for sampling, (c) Revised procedures for determination of quantity of woody biomass that can be considered as non-renewable; and (d) Clarifications as to which leakage requirements are appropriate for projects versus PoAs.
01	01 February 2008	EB 37, Annex 7 Initial adoption.

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